Update on ISCCP-D2-like CERES Data Product

Moguo Sun, Rajalekshmy Raju, Cathy Nguyen
and Michele Nordeen
SSAI
&
David Doelling and Norman Loeb
NASA LaRC

CERES Science Team Meeting
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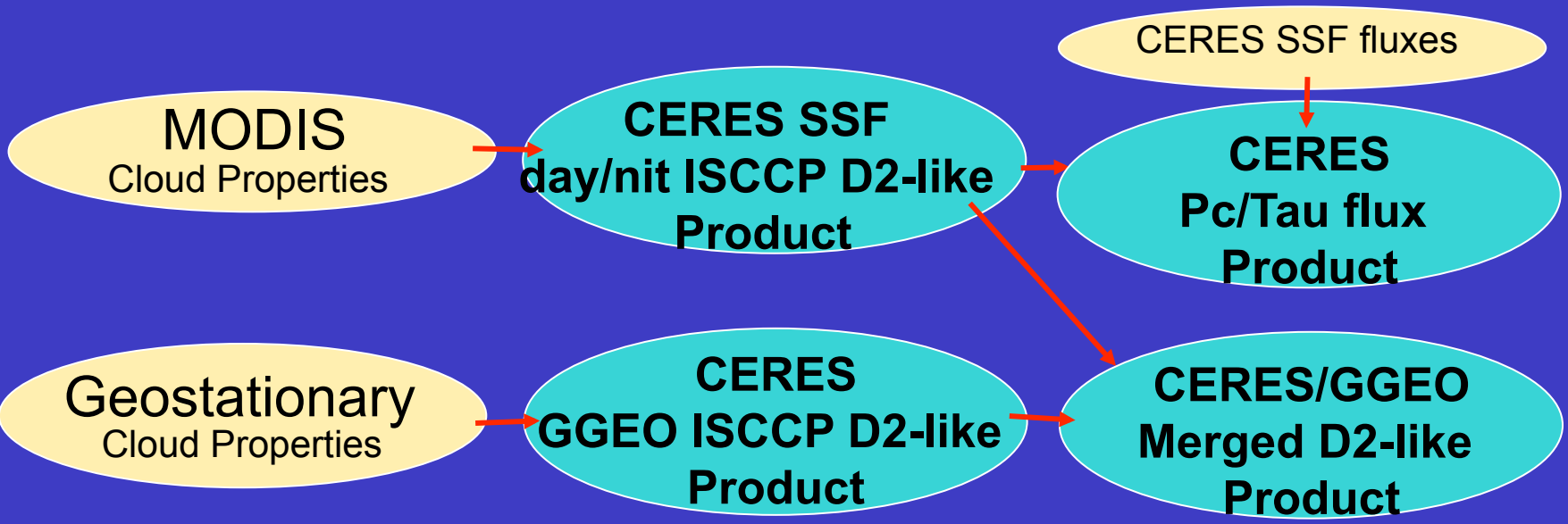
ISCCP-D2-like Products

- Product Features:
  - CERES cloud properties classified into pressure and optical bins that emulate the (GISS) ISCCP D2 monthly mean product



- Appropriate Usage:
  - GCM and climate studies that need Pc/Tau cloud properties to improve cloud parameterizations, etc.

ISCCP-D2-like CERES Cloud types

Cloud top (mb)	Thin	Mid	Thick
High 10-440	Cirrus liq=13,ice=16	Cirrus-stratus liq=14,ice=17	Deep Convective liq=15,ice=18
Mid 440-680	Alto-cumulus liq=7, ice=10	Alto-stratus liq=8, ice=11	Nimbo-stratus liq=9, ice=12
Low 1000-680	Cumulus liq=1, ice=4	Strato-cumulus liq=2, ice=5	Stratus liq=3, ice=6
Cloud optical depth	0.0-3.6	3.6-23	23-380

- Stratify clouds in cloud pressure and optical depth bins
- CERES adds a liquid category to each of the high cloud bins

CERES ISCCP-D2-like Variables

ISCCP-D2like Product Cloud Parameter	**Day/Nit** (MODIS-only)	**GGEO** GEO-only	**Merged**	**Flux**
Cloud Fraction	X	X	X X	X
Effective Pressure	X	X	X X	X
Effective Temperature	X	X	X X	X
Optical Depth	X	X	X X	X
Infrared Emissivity	X		X	X
Particle size (radius, diameter)	X		X	X
Liquid/Ice Water Path	X	X	X	X
# of days/GMT box	X	X	X X	X
CERES fluxes				X

X = MODIS measurement
X = GGEO measurement
X X = merged MODIS and GGEO measurements

- Day/Nit MODIS and GGEO Beta1 products complete from Mar00-Aug07
- Day/Nit MODIS and GGEO Edition1 product release projected Sep 2009
- Merged Beta1 projected Sep 2009, Edition1 projected Dec 2009
- Flux Beta1 projected Dec 2009

ISCCP D2-like Merged Product Development

- To combine MODIS and GGEO cloud properties to create a dataset that is better than either dataset alone can offer.
  - MODIS multi-channel cloud retrievals are based on two overpasses per day and are not diurnally complete
  - GEO retrieves clouds at 3-hourly GMT intervals but are inferior to MODIS

Local Hr	00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24
Terra day				T				
Terra nit								T
Aqua day					A			
Aqua nit	A							
GEO	G	G	G	G	G	G	G	G
Merged	A	G'	G'	T	A	G'	G'	T

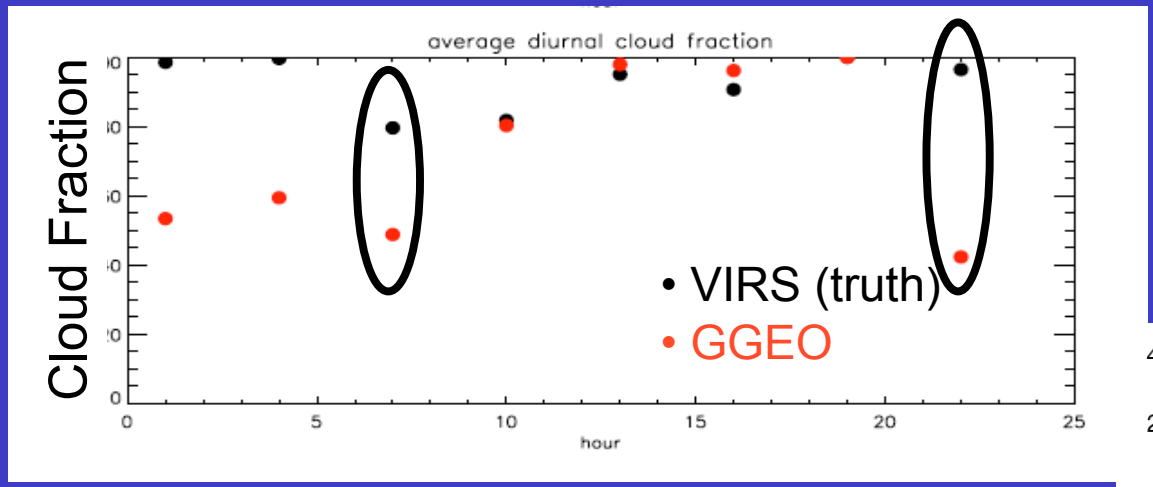
- Merged dataset uses MODIS clouds whenever possible
- Use normalized GEO cloud properties for the remaining hours (similar technique to the GEO SW flux normalization)

Method for Merged Product

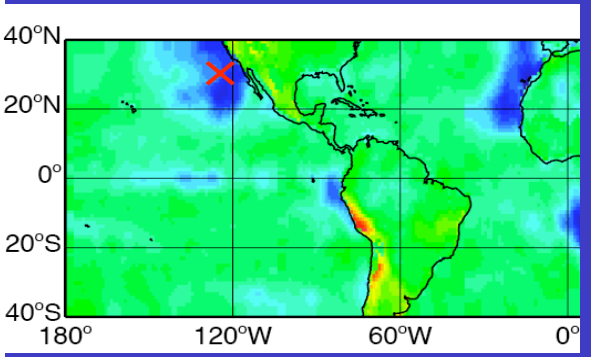
- Use normalization coefficients obtained from matched MODIS and GGEO cloud properties
  - Use all matches within 5x5 regions and 1.5 hours
  - Stratify by geo-type and geo-satellite, similar to SW normalization
- Apply daytime normalization coefficients to the daytime GEO clouds used in the merge product, do the same for night

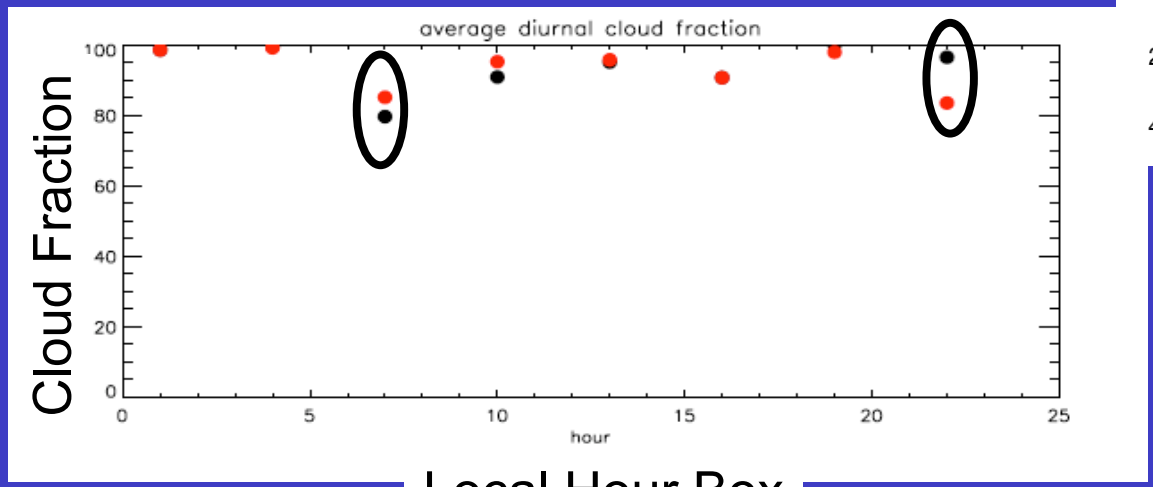
- Validation: Use matched 3-hourly TRMM VIRS/GGEO cloud properties during June-August, 1998
  - VIRS cycles through all SZA in 23 days in tropics

Comparison of the monthly 3-hourly mean cloud amount over Ocean (West of US: 124W, 28.5N) for July 1998



Before Normalization

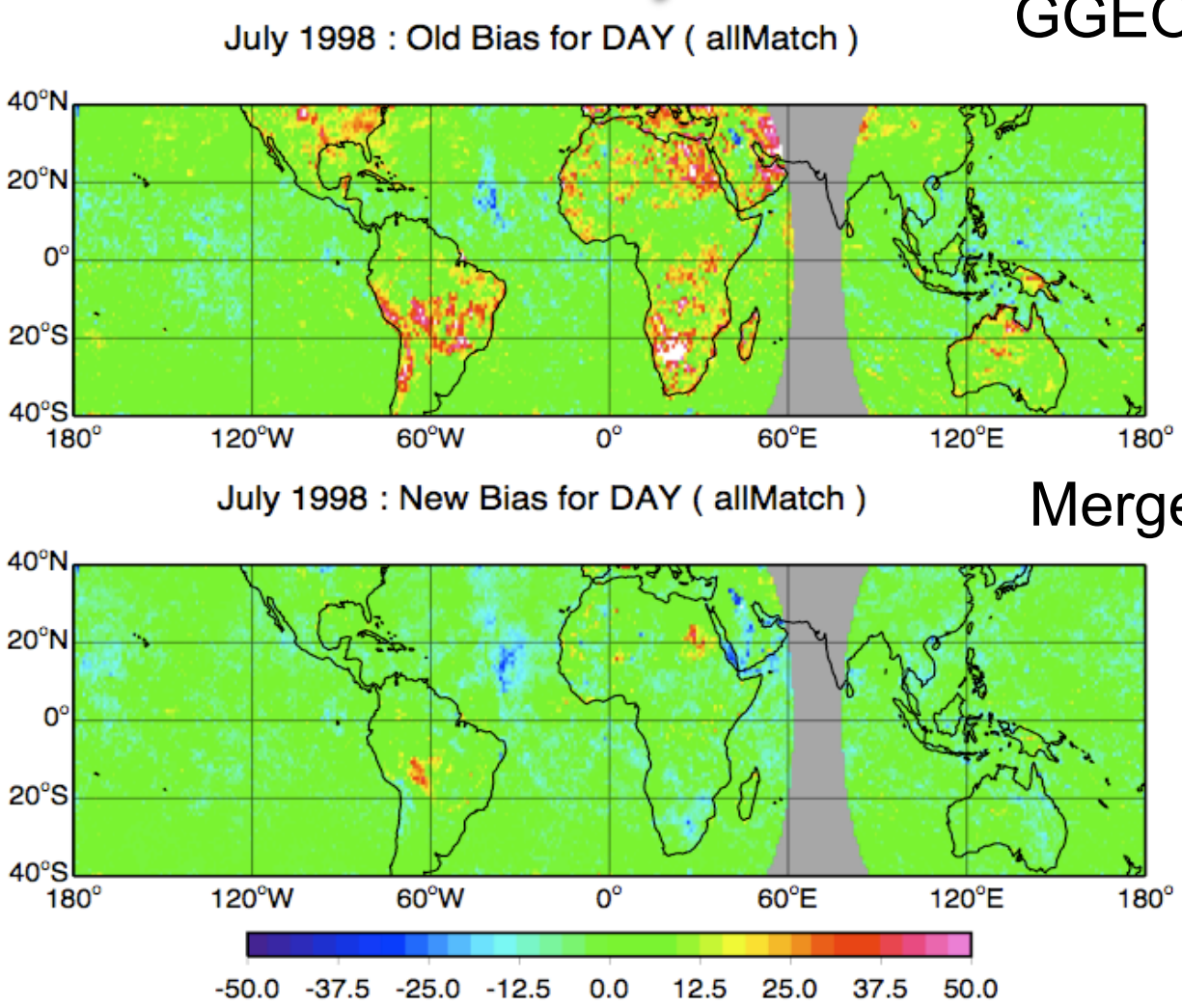




After Normalization

Local Hour Box

Comparison of the mean daytime cloud amount for July 1998



GGEO-VIRS

Before Normalization

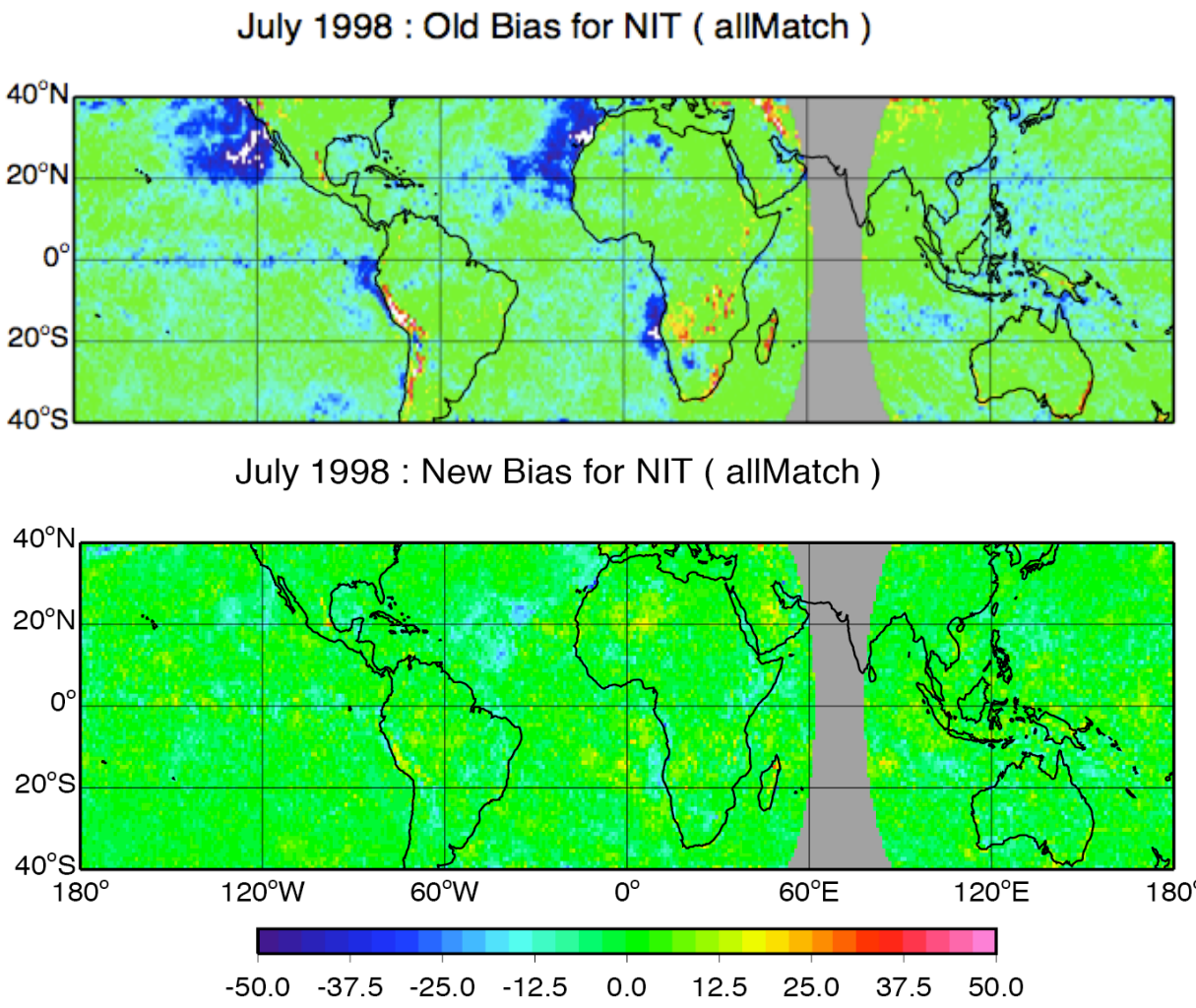
Bias = 4.22

Merged-VIRS

After Normalization

Bias = -1.25

Comparison of the mean night-time cloud amount for July 1998



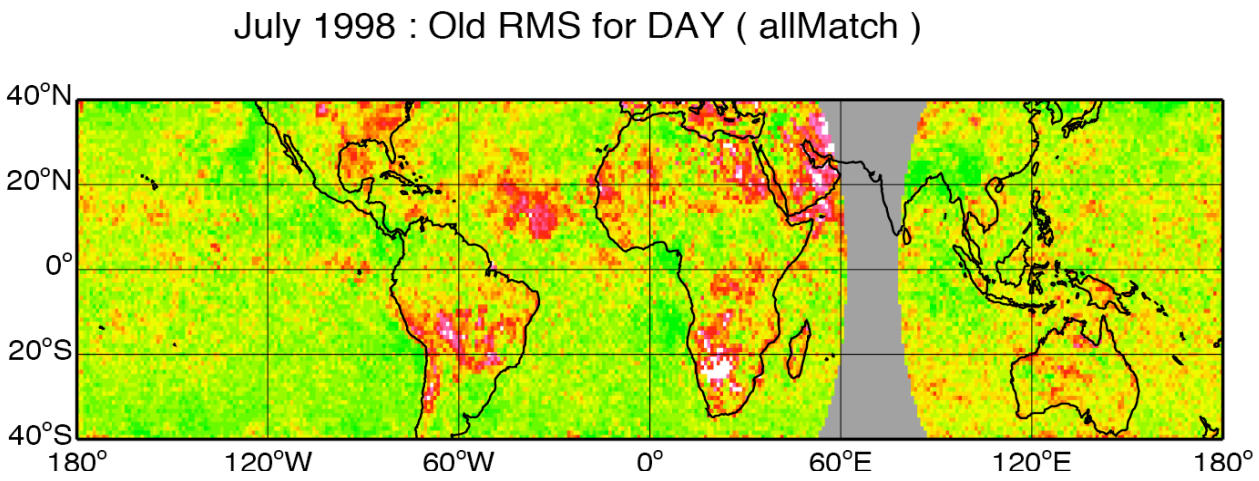
Before Normalization

Bias = -6.06

After Normalization

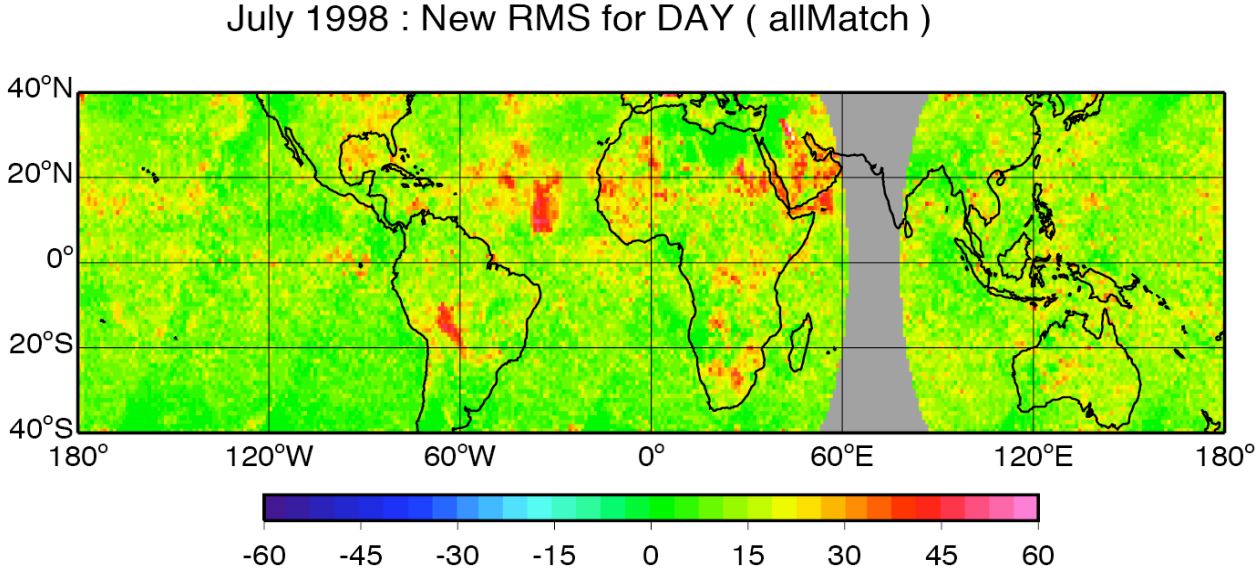
Bias = -0.34

Comparison of the mean RMS for day-time cloud fraction, July 1998



Before Normalization

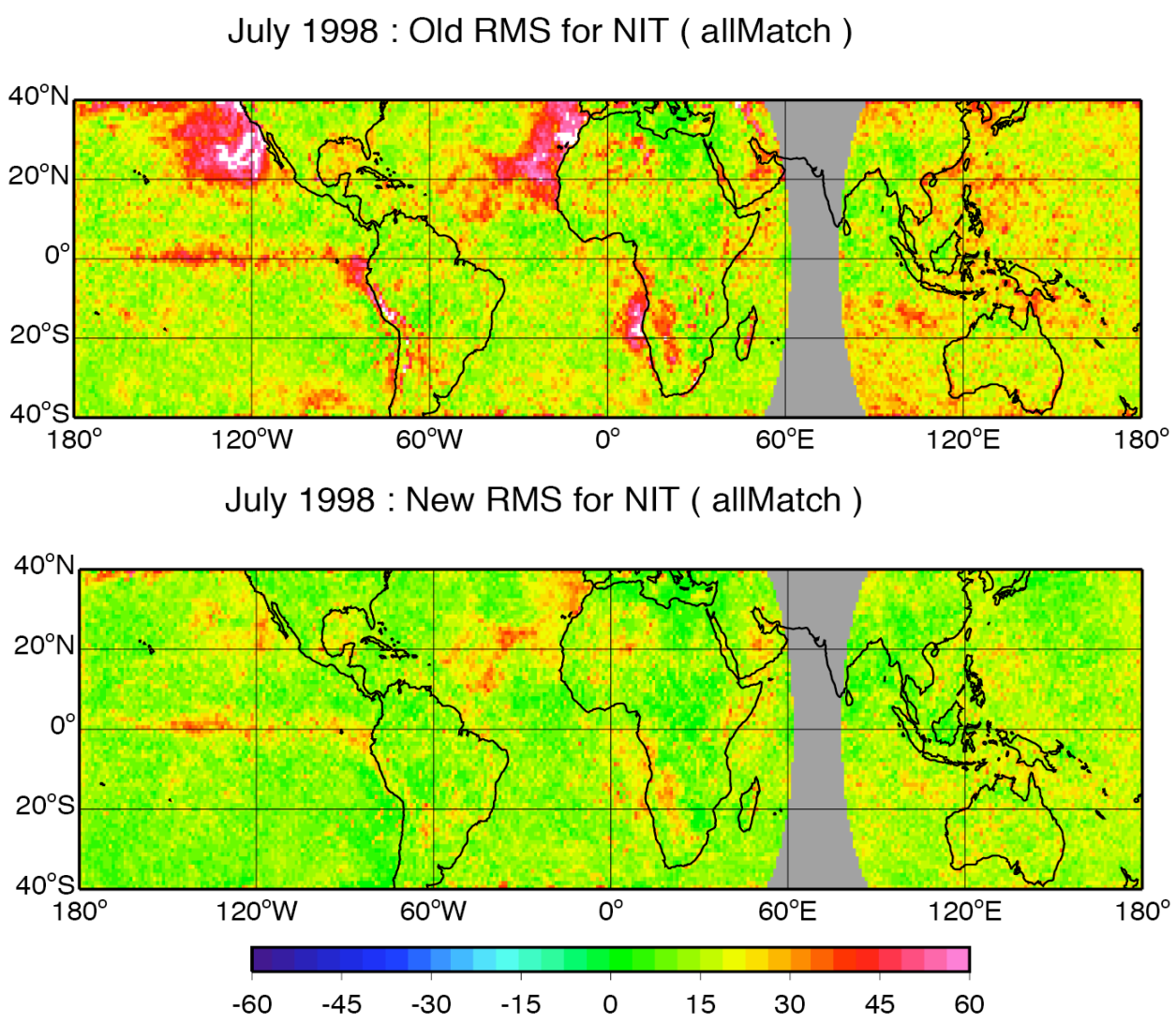
RMS = 19.06



After Normalization

RMS = 13.36 (-30%)

Comparison of the mean RMS for night-time cloud fraction, July 1998



Before Normalization

RMS = 20.42

After Normalization

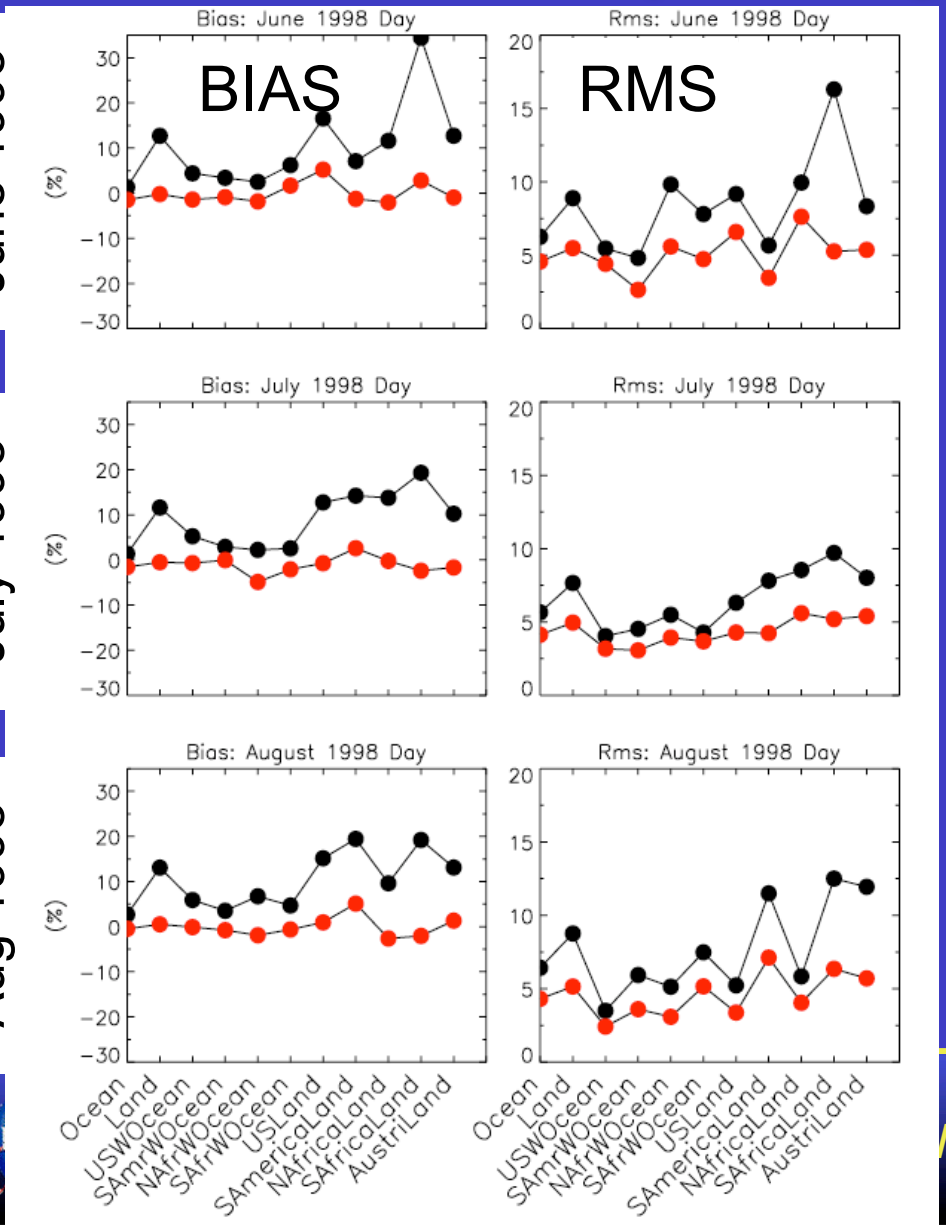
RMS = 14.38 (-30%)

Monthly mean daytime cloud amount comparison classified by Sub Regions

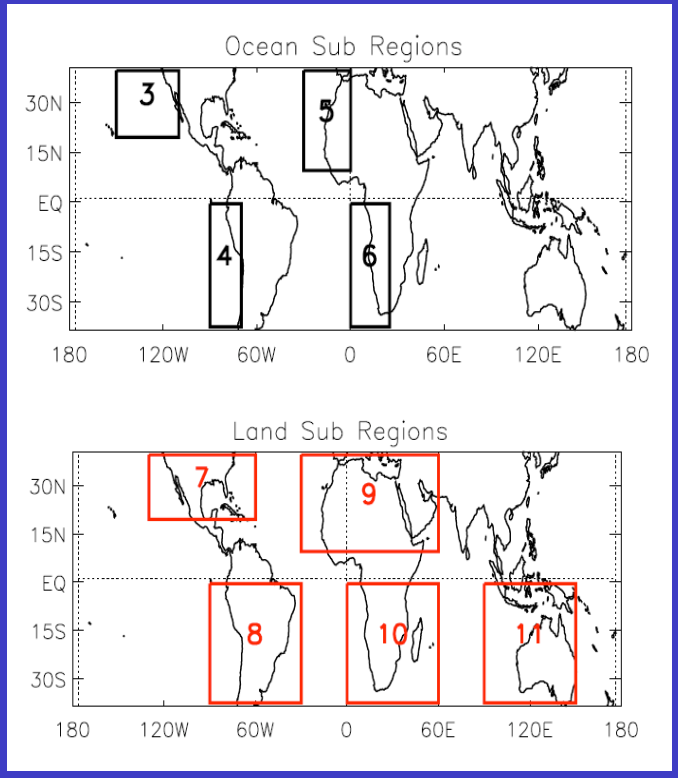
June 1998

July 1998

Aug 1998



- GGEO-VIRS
- Merged-VIRS

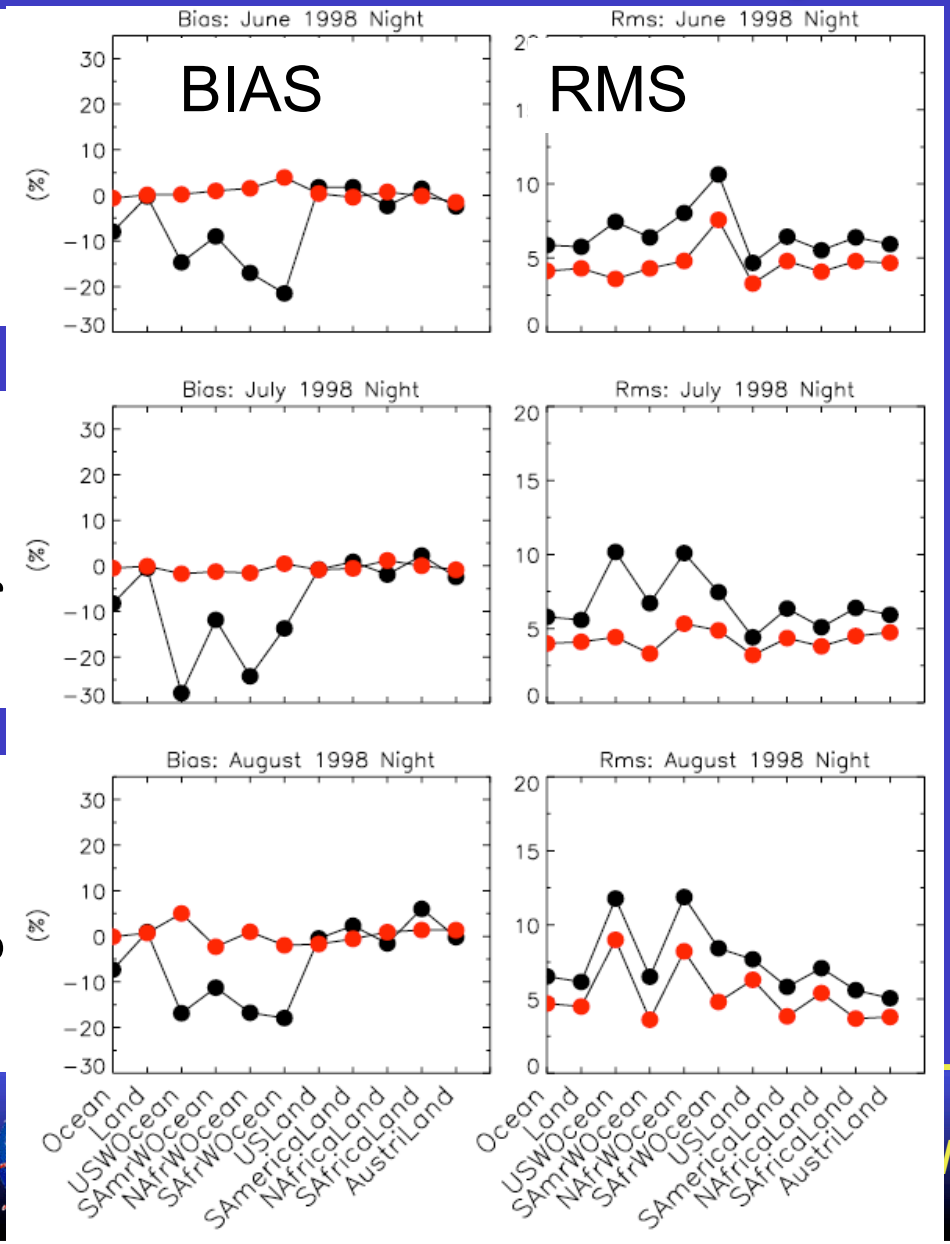


Monthly mean night-time cloud amount comparison classified by Sub Regions

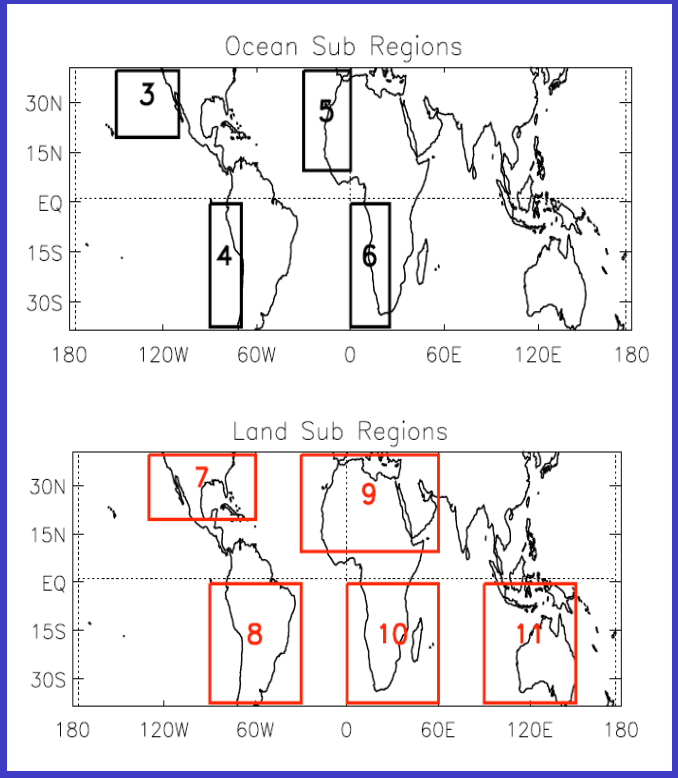
June 1998

July 1998

Aug 1998

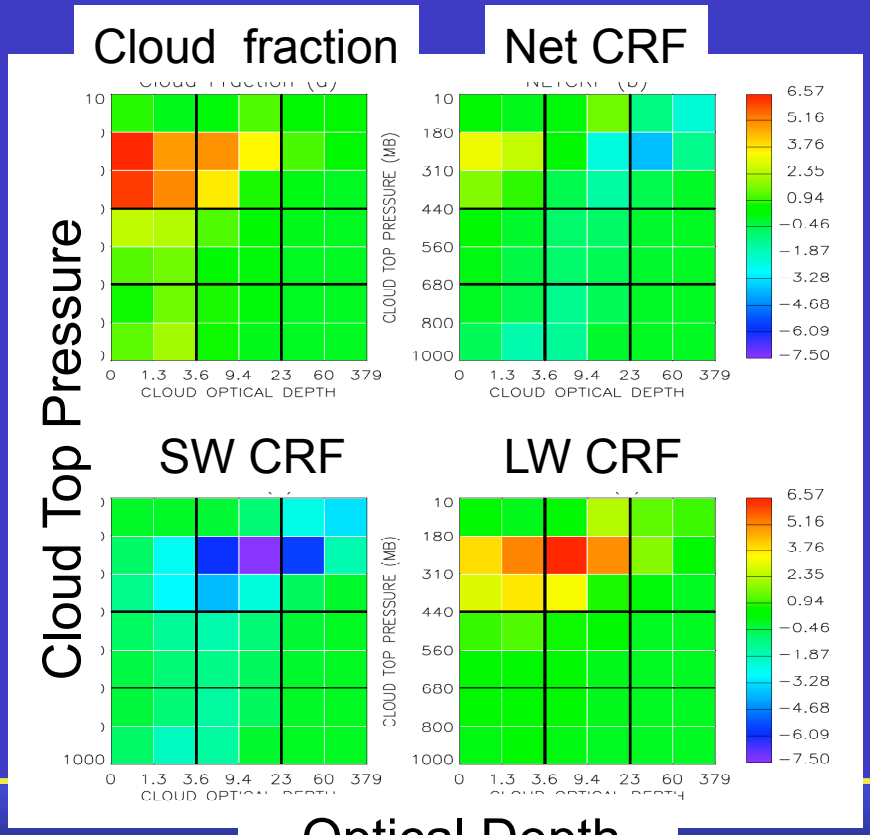


- GGEO-VIRS
- Merged-VIRS



Current Status and Future plan

- Continue to work on Merged data to expand from cloud fraction to other variables.
- To develop ISCCP-D2-like CERES flux product that is associated with D2-like cloud types.



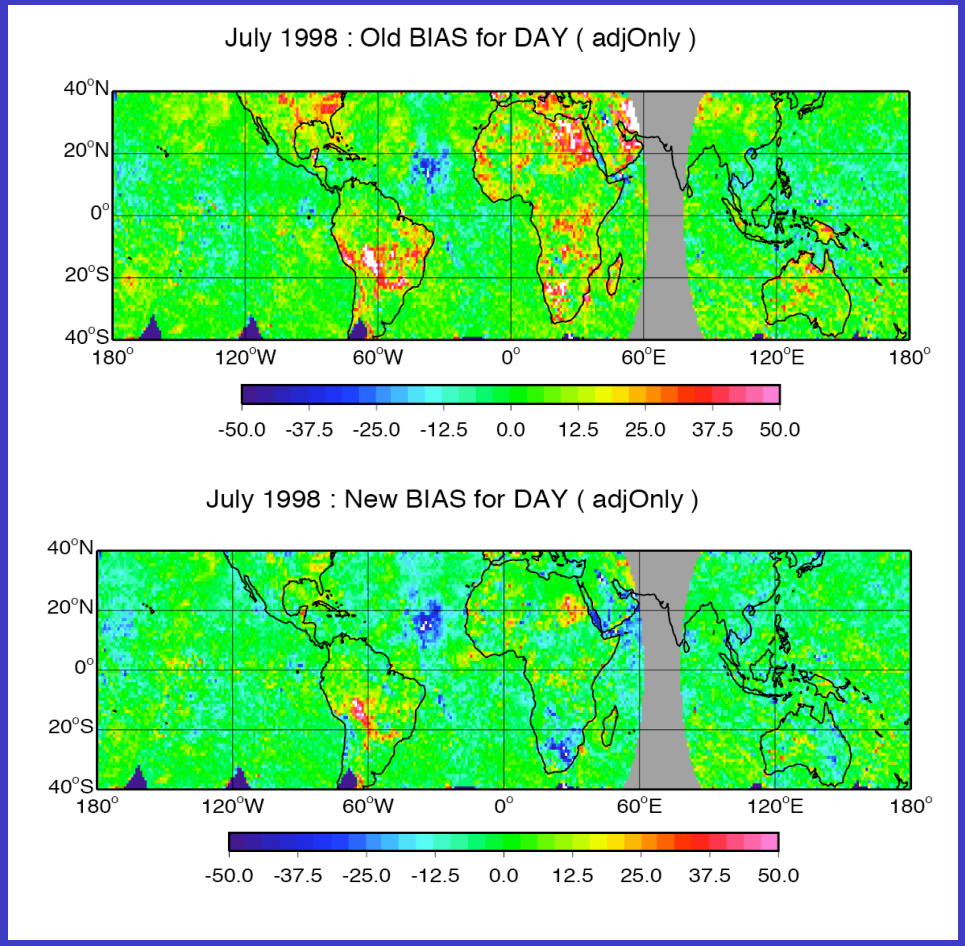
Sun and Cess

Time Line

- Day/Nit MODIS and GGEO Beta1 products complete from Mar00-Aug07
- Day/Nit and GGEO Edition1 products projected Sep 2009
- Merged Beta1 projected Sep 2009, Edition1 projected Dec 2009
  - All 3 products will have the format and read code for Edition1
- Flux Beta1 projected Dec 2009

Thank You!

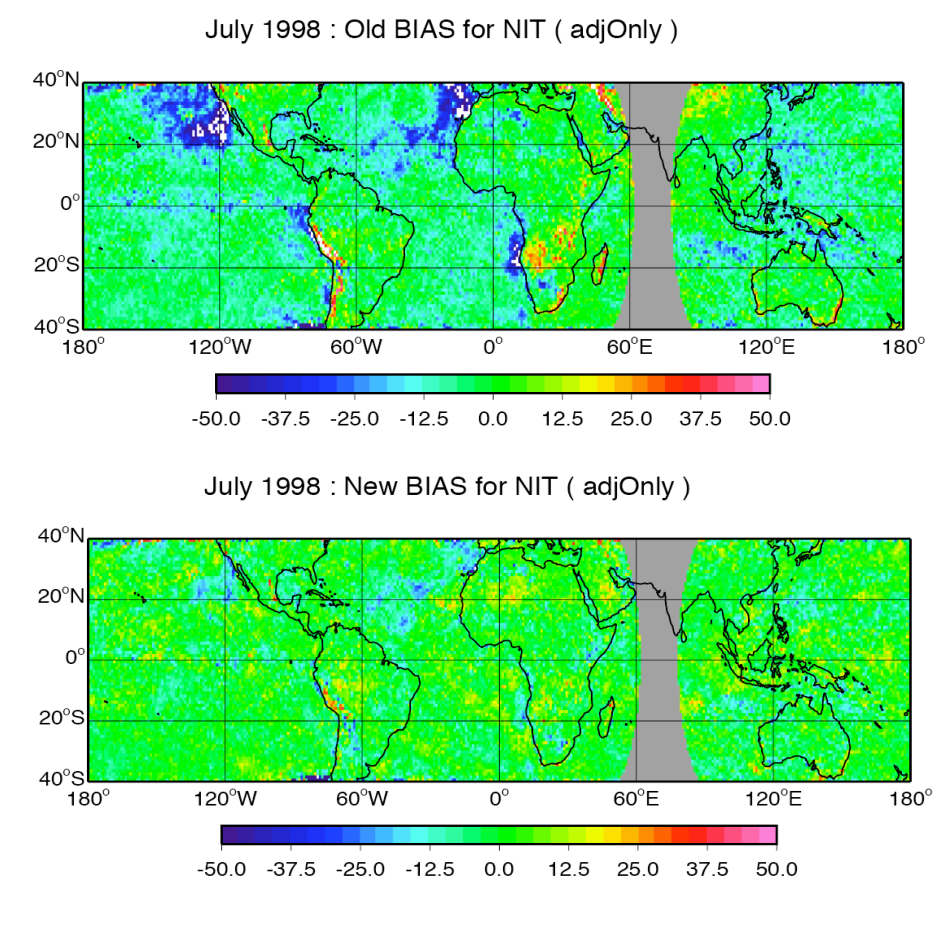
Backups



Bias = 3.74

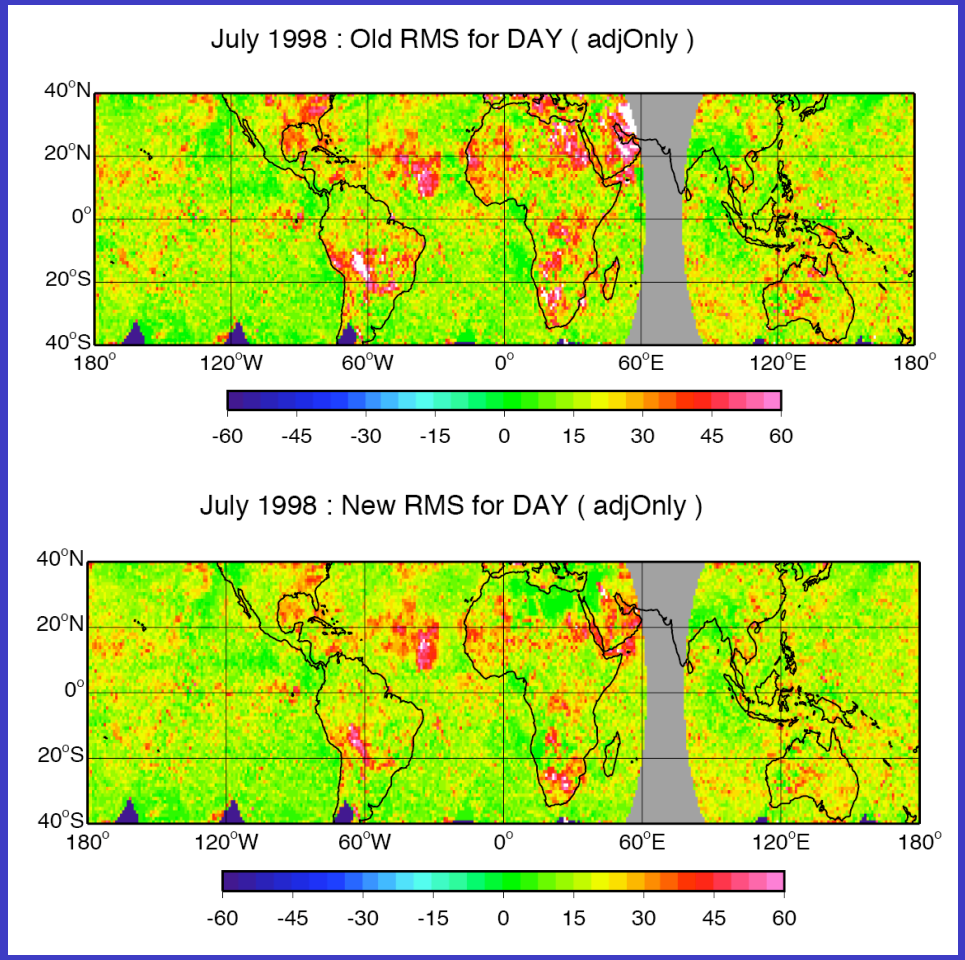
For adjusted GGEO only

Bias = -2.02



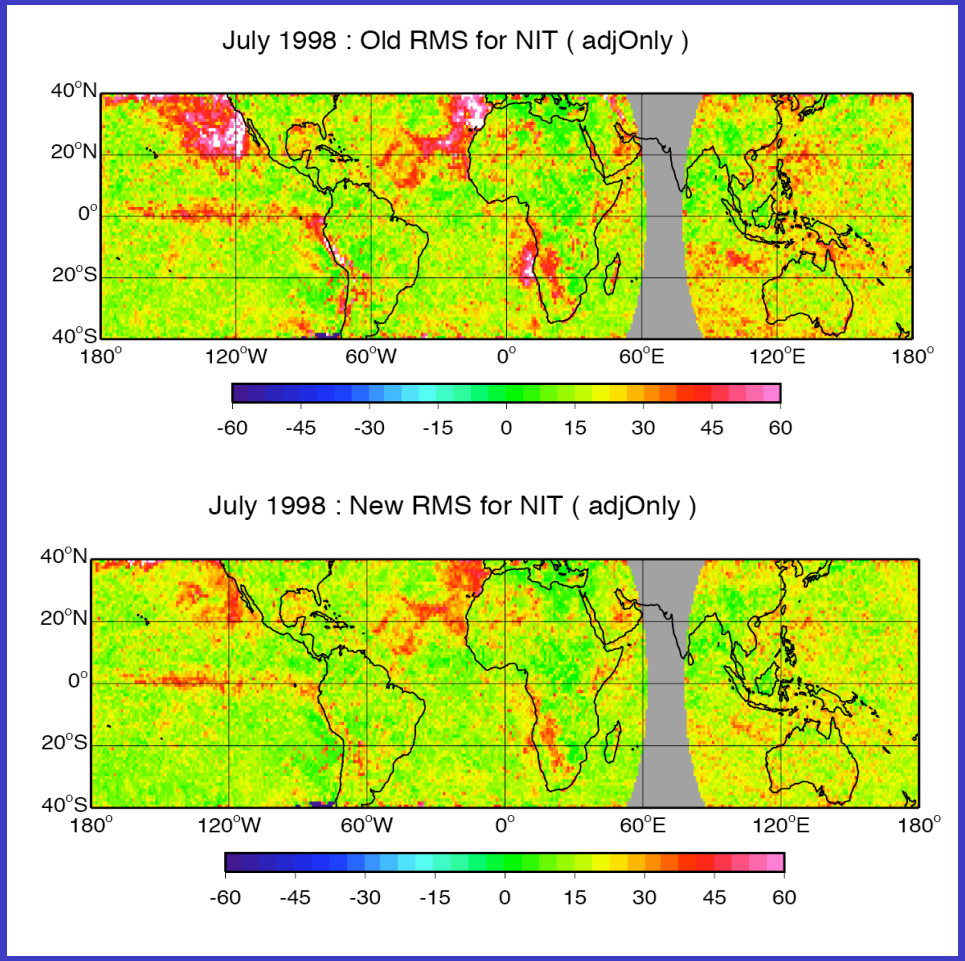
Bias = -6.13

Bias = -0.54



Bias = 18.57

Bias = 17.29



RMS=20.19

RMS=17.75